

with great Attention, Patience, and Sagacity. And it is to be wished that he may continue thus diligently to apply himself to the Study of Natural History.

VI. *Divers Means for preserving from Corruption dead Birds, intended to be sent to remote Countries, so that they may arrive there in a good Condition. Some of the same Means may be employed for preserving Quadrupeds, Reptiles, Fishes, and Insects, by M. de Reaumur, F. R. S. and Memb. Royal. Acad. Sc. Paris. translated from the French by Phil. Hen. Zollman, Esq; F.R.S.*

Read from March 10.
1747-8. to April 27,
1748.

PERSONS who have at Heart the Progress of Natural History, and intend to facilitate the Study of it, must needs be desirous to see the Collections of divers Sorts of Productions, which form the Objects of it, multiplied and enlarged, and therefore will be disposed to contribute towards it with all their Ability. Those Collections present together in one Place more different Sorts of Bodies of the Mineral, Vegetable, and Animal Kingdoms, there to be at Leisure compared and examined one against the other, than one could hope to find successively in the longest and most laborious Voyages and Travels. In order to render those Collections

as complete as possible, there should be in all the Countries of the World Men zealous for their Improvement, who should take Pleasure in transmitting the particular Productions of those Parts which they inhabit, to such Repositories as they know to be already considerable, and intended to be rendered useful to the Public.

That Part of Natural History which can offer to us the largest Series of agreeable Objects, and actually offers a vast Number which are not sought after merely for the Pleasure of looking upon them; *viz.* that Part which treats of Birds, has remained as yet very imperfect, nor has it yet made them sufficiently known to us, because no considerable Collections have hitherto been made of them; and those who had begun to make any soon became weary of going on, having had the Mortification to see them every Day destroyed by ravenous Insects, in spite of all the Care that had been taken to preserve them against their Teeth. *M. Reaumur* having found easy Methods of preparing Birds which are intended for those Collections, so as to put them out of Danger of being spoiled, and to make them look as if alive, has thus found what was still most desired, *viz.* the means of putting them out of Harm's Way from greedy Insects. He intends soon to inform the Public how to render with Success this sort of Collections durable. He has had the Luck to make one, which is already very numerous, and has Room to hope that it will be still larger. The Birds, for which he is obliged to several learned Men, Lovers of Natural History, are an Earnest to him that he shall owe Thanks to
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them for more, according as they shall find Opportunities to procure them for him: Besides he is sensible how much he may depend on their good Disposition to instruct him, for which he is very thankful.

However desirous one may be of sending Birds of the Country where one lives, to another, where the like are not to be seen, one may be at a Loss how to send them on a long Journey without their being disfigured or falling to Pieces by Corruption on the Way. I am going to explain here the different Means one may have recourse to, for keeping them from Corruption, and to make them arrive in a good Condition.

The first Way.

The Method hitherto practised to acquaint Natural Philosophers of very remote Countries with Birds of another Country, is to send them stuffed, that is to say, to take off their Skin with all the Feathers upon it, from the Body and the Thighs, leaving the Legs, the Wings, and for the better Conveniency the whole Neck with the Bill sticking to it. Filling afterwards the Skin thus taken off with some soft Stuff, either Straw, Hay, Wool, or Flax, &c. or even stretching it over a solid Mould of the Shape of the Bird, you give to this Skin, as near as possible, the Form of the Body of the Bird, which it had when it covered its Flesh and Bones; in which one sometimes succeeds tolerably well, by Attention, and some small Processes, the Particulars of which are not intended here to be entered into.

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The second Way.

The foregoing Way of preserving the Shape of Birds requires a Hand used to it, and even falls short of sufficiently imitating Nature, unless with Care and Time. So it is certainly most convenient only to send the Bird as it has been received. There is no great Skill required for putting one or several into a Vessel full of Spirit of Wine, or very strong Brandy. It has been usual for a long time to make use of those Liquors with Success for preserving the Flesh of dead Animals; and wherefore has this Method so seldom been used hitherto to prevent whole Birds from Corruption? Perhaps it is because their Feathers do not shew those various and bright Colours, which are natural to them, whilst they are immersed in some Liquor, and which appear no longer on the Bird's Feathers when taken out of it. Besides, the Vanes of the Feathers are then disordered, and glewed too much together. Upon these first Appearances, it was judged too hastily, that spirituous Liquors changed the Colours of the Feathers, and hinder'd the reducing of them to the Order and Pliability they had upon the Animal, when dry and living. However repeated Experiments have made M. *Reaumur* sensible, that the Colour of the Feathers is Proof against the strongest Brandy, and even Spirit of Wine, and that after having dried the Bird that had been soaked, one may easily put its Feathers into their natural Order, and make it appear as it was when alive:

1. To preserve Birds which are to be sent far off, you are only to keep them in Brandy; the stronger it is the better it will be for producing the intended Effect: Spirit of Wine is even preferable. As for the rest, it is indifferent whether the Brandy be distilled from Wine, Corn, or Sugar.

2. Though the Birds may be put into the Liquor so as one receives them, yet some small Attention is to be had, and some Precautions to be used, before they are dipped in, which contribute towards preserving them in a more perfect State. If any of the Bird's Feathers are bloody, you must wash them from time to time with a wet Linnen, till they do not any longer leave a Mark upon that Linen, or in the Water in which they are soaked. Above all it is of Consequence to hinder the Feathers from taking a wrong Bent, or rumpling. It is easy to put them into the Shape they are to be, by smoothing them with a Finger from the Head towards the Tail in squeezing them together. This helps the Feathers to take the Position which is most natural to them, and in this Position they are kept by wrapping the Bird up in a Rag, tying about the Neck and the Body several times a strong Packthread: The Feathers on the Neck are chiefly those which must be kept from turning aside or backwards.

3. The Precaution of taking out of the Body the Intestines and other Parts it contains, is not absolutely necessary; it is better however to do it: If afterwards one supplies their Place, by filling the Cavity of the Belly with all the Quantity it can contain of Wool, Hemp, Cotton, or other soft Matter; if you fill the Neck, though without distending

been weakened by Evaporation, and by the aqueous Juices extracted from the Flesh.

6. If those Birds are not to arrive by Sea to their Journey's End, if they are to be carried by Land for Part of their Way, one must contrive it so, that they may not be liable to be tossed by much Jumbling; and they will be less so, if the Vessel is so much fuller of them; they will close the more together. In case they should float too much in the Liquor, you need not scruple to press them with Hay or some other Stuff, which you thrust into the Vessel.

7. It is still more easy to hinder the Birds from being tossed, and they will even be the better preserved, if before you send them you take them out of the Liquor, in which they have lain a sufficient Time; it has made them fit to dry without any Danger of Corruption. Small Birds, such as of the Bigness of Sparrows, and even of Black-birds, after having been cover'd 8 or 10 Days with strong Brandy, may be taken out without any Fear of their being corrupted. Large Birds, and especially such as are very fleshy, are to be kept longer in the Liquor; but there are none or few, for which it may not be enough to have lain in it a Month or five to six Weeks. According as you take them out, you must range them one next to the other, and upon one another in a Box, filling up the Intervals with a Matter easiest to be had, as Chaff of Oats or Barley; that is to say, those small Shells in which the Grain was wrapped up whilst it stuck to the Ear. This Chaff is the best Stuff for this Use: You may also use small Hay, Moss, Hemp, Cotton, &c. Far from its being necessary to leave the
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the Birds to dry before ranging them in the Box, the best is to put them in quite dripping with the Liquor. Having filled the Box well, there remains only to shut it up.

8. Any Box, of what Form soever, may be fit for Birds which are to be on the Journey only for some Weeks or a few Months: Such as are to travel Years, require more Precaution; though they are not subject to Corruption, yet they may be torn to Pieces before their Arrival, if Insects greedy of them can come at them, and multiply in their new Habitation. One may by Care so well close up those Boxes, as to render it impossible for those dreadful Insects to get to the Inside; Paper glued over all the Joints will prevent it. But Barrels are preferable to Boxes, for such Birds as are to remain shut up for a Year or longer; the smallest Insects will not find a Passage for creeping into a Barrel, which will not permit the smallest Drop of Liquor to get out. Birds being put wet into the Barrel, keep from drying up too much, and keep one another the closer. As good Luck will have it, carnivorous Insects are none of those that will pierce Wood. So by using Spirit of Wine or strong Brandy, as we just now said, one will succeed in having those Birds arrive in a good Condition at the remotest Places. There is still another Way for it, which may appear more convenient, especially for Birds of a large Size.

The third Way

Is to preserve Birds by a sort of Embalming, and even by actual Embalming, in Countries
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where the Spices are cheap. First, you begin with emptying the Body of the Bird, and then fill it with those Powders I am going to specify to you; you also fill its Neck with the same Powder, thrusting it in through the Bill. If the Bird is extremely fleshy, you may make an Incision in the Flesh of the thick Part of each Leg, and one in the Flesh of each Wing; that is to say, two on the Breast, and one nearer the first and large Bone of each Wing, into which you put the Powder; having afterwards brought the Flesh together again, and put the Feathers in Order, those Incisions will be hid so as not at all to disfigure the Bird. But there are very few on which it was necessary to make such Incisions; one may make some even inwardly, which will serve as well; having thrust your Fingers into the Belly, you may tear the Integuments over-against the thick Part of the Leg, and in other Places, and make Cavities to be afterwards filled up with the Powder.

2. There are many Powders proper to produce the principal Effect intended here, which is to promote the Bird's drying before it be so far corrupted as to occasion the falling off of the Feathers. All sorts of Spices may be used for it with Success; if there are any in the Country which are very cheap, you may use them. You may even make use of a Powder composed of as many Sorts of Spices as you will, the Result of which will be at least, that the Bird, after being dried, will smell the sweeter, and become as it were a Piece of Perfume. But instead of using resinous Gums, as Aloe, Myrrh, Frankincense, and other Productions of Plants, as Cinnamon, Cloves, Pepper, Ginger, &c. which are dear Materials,

terials, you may content yourself with a Salt which is cheap in most Countries; it is sufficient to fill the Cavity of the Body and of the Neck with Alum reduced to Powder. A Material still easier to be had in all Places, and very cheap, and which works with great Effect, is Lime. If it can be had quite unslack'd, you will take it preferably; however, without scrupling to take such as is old, and which has been somewhat slackened by the Humidity of the Air.

After the Body and the Neck of the Bird have been filled up, either with pulverized Lime, Alum, or any other Powder, you put it into the Box or the Barrel, in which it is to be transported. You will take care, in placing it, to give a natural Position to the Neck, neither to give to the Legs any other Inflexion than they had when the Bird stood upon them alive. At the Bottom of the Box or the Barrel there is to be a Layer of the Thickness of an Inch, or thereabouts (if there be more there will be no Harm) of the same Powder with which the Cavity of the Body is filled, or of any of those which are proper for it. You bury the Bird in this Powder, and put enough of it about it and upon it, so as to cover it with a Layer of the Thickness of an Inch or more. The outward Powder will make it dry the sooner, and keep off voracious Insects, which will not care to attempt to pierce through it in order to come to the Flesh they are fond of. During the first Days, and even during the first Weeks, the Birds may cast a bad Smell, which you need not be uneasy at, for it will lessen in proportion to the Bird's drying; and it will dry
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so that none of the Feathers will come off; and when it is once dried, they stick fast to it for ever. This Way of preserving Birds, which is very simple, has procured to M. *Reaumur* some from very remote Countries, which arrived as wished for.

The fourth Way.

This is one, by which Birds are more speedily dried, than by that which is explained before; it is to dry them by the Heat of an Oven. You make use of that Heat which remains in it after the Bread is taken out of it; sometimes it is then too great, but there is a plain Way to be sure that the Degree of Heat is not too great, which is, to put Feathers into the Oven, and to take them out 5 or 6 Minutes after; if you find that they are not singed, nor turned red, you ought not to be under any Apprehension for the Feathers of the Bird, which is to be put into the Oven. Small ones need remain in it only one or two Hours to be sufficiently dried; those of a middling Size require a longer Time; and those which are big, and very fleshy, ought to be put in at several times. When they are grown cold, you may know whether they are dried enough, by pressing with the Finger the Flesh of the Legs and of the Breast; if it does not yield, or yields but little under the Finger, the Bird does not any more want to be put into the Oven. The Inconveniency attending its being kept there longer than is necessary, is, that some Parts of it, as for instance, the Neck and the Rump, are thereby render'd too brittle. You will prevent the Bird's Bulk sensibly diminishing

minishing in the Oven, if, before you put it in, you fill the Cavities of its Body and the Neck with some soft Stuff, like any of those which we mention'd to be us'd for filling the Cavities of such Birds as are intended to be preserved by the means of Spirit of Wine, *viz.* Hemp, Flax, Cotton, &c. What is the most difficult in the Way of drying Birds in the Oven, is not hitting the proper Degree of Heat, and to know the Time how long they are to be kept in it: Here will be the Difficulty, how, as this Way of drying requires the Bird may be kept in a natural Attitude, before it is put into the Oven: If dried, it will be fixed for ever in that which it once received. There are several Ways, plain in themselves, for putting and keeping the Bird in its natural Attitude, which however would be too long to be explain'd as to the Particulars; the little we shall say of them, will be sufficient to industrious Persons for their Use. The Bird may be kept in Order by the means of a Frame, made like a Farrier's Travise; it is compos'd of a small Board, which forms the Basis of it, the Length of which need not be greater than that of the Bird: On each Side of this Board rises an upright Post of Wood; these four Posts are secured by Traverses fixed to them by small Nails: The Use of those Posts and Traverses is to keep fixed the small Ribbons and Threads, which keep the Body, the Wings, and the Neck of the Bird in the Position it has been brought to. A Thread run through the Head of the Bird, with the Help of a Needle, enables you to place it as high or low as you please. There are various Ways of fixing the Feet on the Board, with the Claws extended;

extended; it may be done with small Points of Nails. With a Wire only, and a small Board, all may be done as well as with a Frame: This Wire is run through all the Length of the Body and of the Neck of the Bird, by insinuating it through the *Anus*; but before doing so, you make a sort of a strong Knot to it, by twisting it; this Knot is to touch the *Anus*; it afterwards hinders the Bird from sliding: Close by the Knot you bend down perpendicularly that Part of the Wire which is without the Body, and which is to be at least of a Length equal to the Height which the Legs are to have; you make afterwards its End pointed by filing, if you have not already done it, and you run it into the Board. That Part of the Wire which then is out of the Body, serves for a Supporter, which keeps the Bird raised, because it is continued to the rest of the Wire which runs through the Body and the Neck: The Wire which runs through the latter keeps it in its bending Way, and the Direction that has been given to it.

Dried Birds ought to be sent in Boxes or Barrels sufficiently closed up, that Insects may not slip in during the Journey; and you will take care to fill up all the empty Spaces left in the Barrel with some of those soft Stuffs, which we have already pointed out for such Uses. Many Weeks, nay even Months, may pass between the Time, when you have dried the first Birds you intend to make a Collection of for a Journey, and that Time when they are to set out: This Interval is dangerous. There are certain Worms, and certain Beetles, which are more greedy after those dried in the Oven, than after those dried
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any other Way; if they meet with free Access, they sometimes seize the first Moments to settle under the Feathers, or in the Bodies, where they multiply.

You will put your Birds out of the Reach of the formidable Teeth of those Insects, if after they have been taken out of the Oven, you bury them in Sand contained in a large Box or a Barrel. You must take care in covering them with Sand, that they may not contract bad Attitudes, and that their Feathers be not ruffled. Slack'd Lime reduced to Powder, Chalk, and all earthy Powders, fine and dried, may be successfully employ'd for the same Use. You will press with your Hand the Surface of the Powder, to render the uppermost Lay compact, which is very necessary. Lastly, if from the falling of the Feathers it appears that the Insects have defeated the Precautions taken against them, there is still a Remedy left; you may stop the Progress of the Evil by putting the Bird again into the Oven, not hot enough to singe the Feathers, but hot enough to kill the Insects in less than half an Hour.

Remarks that are common to the four Ways of preparing Birds.

1. It will not be amiss to send two or three Birds of each sort; and, as near as you can, let there be one Male and one Female.

2. One cannot help being curious to know the Name which each Bird bears in the Country where it was taken: You write it with common Ink upon a Slip of

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Parchment,

Parchment, which you tie with a Thread to one of its Feet; the Writing will be preserved, even when the Bird is in Brandy.

3. If you know of a Bird any thing besides its Name, you may make a small Note, shewing in what Places it lives; what it feeds upon; whether or no it stays all the Year in the same Country; how and where it makes its Nest; how many Eggs it lays; the Wiles and Cunning particular to it; whether it is good to eat; in short, whatever is known of its History.

4. A Collection of Nests is a proper Repository to be joined to that of Birds; it shews such Works as hardly could be imitated by Men, admirable for their Form, their Workmanship, and the Materials employed in them: *M. Reaumur* has already made such a Repository. If one can have Nests not too bulky for easy Transportation, you may be sure to see them with Pleasure joined to the Birds that have built them.

5. The Colours and Figures of the Eggs make also Part of the History of Birds; Collections made of them will give Satisfaction to curious Minds: Those which are to be sent would be in Danger of being broken on the Way, by the very Substance they contain, if it comes to ferment. Before you send them therefore, you must empty them: To this end you make a small Hole on each End, and shake them; and if this Shaking will not be enough, you blow into one of the Holes to force out through the other what liquid Matter remains in the Egg.

Quadrupeds.

Quadrupeds that are not of too large a Size, and particular to certain Countries, may be put into a State fit to be sent to the most remote Parts, by one of the four Ways used to preserve Birds: You may make durable Collections of them like those of the latter. M. *Reaumur* has begun one, which makes Persons who see it wish that there might be more complete ones of the same kind.

Fishes and Reptiles.

Fishes and Reptiles, which, as well as Quadrupeds, are engaging Objects for Naturalists, are easier to be sent; it is sufficient to put them into Barrels full of strong Brandy. They may also be dried, either by Materials with which you may fill the Cavities of their Bodies, or by a gentle and well-manag'd Heat.

Insects.

Insects, which offer to us so many admirable Varieties, deserve the Care of gathering them into Collections, which cannot but be precious to those who have made those little Animals their Study. All those which are soft, as for instance Worms and Caterpillars, may be preserved in Brandy. Their tender Colours will run less Hazard of being alter'd, if you put into the Brandy such a Quantity of Sugar as it is able to dissolve. Beetles may also be put into the same Liquor; but Butterflies and Flies would be spoiled in it: After having killed them, you must range them in Lays in Boxes, and separate those Lays with Beds of Cotton. Though one ought to collect in each Country, preferably, those which strike

most, either by the Variety and Lustre of their fine Colours, or by their Size, or by their singular and odd Form, or by the Use one knows to make of of them; yet you ought not to neglect to collect and send such as do not offer so remarkable Singularities, such as even are most common. There are among the latter some, which have wherewithal to satisfy an Observer, who looks upon them with other Eyes than those wherewith they had been regarded before, and with other Views.

VII. *A beautiful Nautilites, shewn to the Royal Society by the Rev. Charles Lyttleton LL.D. F. R. S. and Archdeacon of Exeter.*

Shewn May 5.
1748. **T**HIS curious Fossil seems to be composed of a stony Matter like Marble, which has penetrated the Cells of the *Nautilus* while in its natural State. The Diaphragms or Partitions remain still distinct and visible. The different Colour of the stony Matter in some Cells of a dark-brown or Hair-Colour, in others of a light-brown or Ash-Colour, with the natural Polish of the Outside, gives it a beautiful Appearance; as it is represented in the annexed Print (*See TAB. Fig. 2.*) where it is drawn of its natural Size in three different Views.

A shews the Side View of it.

B the fore Part.

C the back Part.

C. M.

It